

A CONTRIBUTION TO THE DESMID FLORA OF NEW HAMPSHIRE.

JOSEPH A. CUSHMAN.

(Continued from page 119.)

EUASTRUM Ehrenb.

E. CRASSUM (Bréb.) Kütz. (*E. magnificum*, var. *crassioides* Hast.) Length 155–176 μ : breadth 78–90 μ : isthmus 25–28 μ : breadth of polar lobe 42–61 μ . North Woodstock! Pudding Pond, North Conway! Rochester (*Hastings*).

* Var. *pulchrum* var. nov. (Plate 64, fig. 1). Variety with four small central granules and an abundance of smaller granules arranged as in the figure, in form more like the typical form than like var. *scrobiculatum*. Length 155 μ : breadth 75 μ : isthmus 25 μ : breadth of polar lobe 46 μ . Pudding Pond, North Conway! (Herbarium Cushman no. 118).

Var. *ORNATUM* (Wood) Hansg. (*E. ornatum* Wood.) Length 175 μ : breadth 95 μ : isthmus 25 μ : breadth of polar lobes 56 μ . Pudding Pond, North Conway, frequent! Saco Lake (*Wood*).

E. MULTILOBATUM Wood. Length 130 μ : breadth 65 μ : isthmus 18 μ : breadth of polar lobe 21 μ . Intervale! Pudding Pond, North Conway! Saco Lake (*Wood*).

E. PINNATUM Ralfs. Length 133 μ : breadth 72 μ : isthmus 17 μ : breadth of polar lobe 35 μ . North Woodstock, common!

* *E. CUNEATUM* Jenner. Length 102–140 μ : breadth 59–62 μ : isthmus 14–15 μ : breadth of polar lobe 28–33 μ . Mt. Moosilauke!

* Var. *granulatum* var. nov. Variety with the surface covered with fairly large granules. North Woodstock!

E. WOLLEI Lagerh. Length 170 μ : breadth 108 μ : isthmus 21 μ : breadth of polar lobe 60 μ . Surface granular. Pudding Pond, North Conway!

E. ANSATUM Ehrenb. (*E. Ralfsii* Wood.) White Mountains, (*Wood*).

* As in the preceding part of this paper, starred forms are new to the New England Flora.

E. DIDELTA (Turp.) Ralfs. Length 98–152 μ : breadth 56–75 μ : isthmus 15–19 μ : breadth of polar lobe 20–31 μ . Intervale! Pudding Pond, North Conway!

E. AMPULLACEUM Ralfs. Length 90–100 μ : breadth 56–59 μ : isthmus 13–17 μ : breadth of polar lobe 23–25 μ . Pudding Pond, North Conway, frequent!

* *Forma SCROBICULATUM* Nordst. Noone's Station! (H. C. no. 392).

E. VERRUCOSUM Ehrenb., var. *REDUCTUM* Nordst. Length 78 μ : breadth 65 μ : isthmus 16.5 μ : breadth of polar lobe, 32 μ . North Woodstock! (H. C. no. 187).

E. CIRCULARE Hass. Length 65 μ : breadth 43 μ : isthmus 12.5 μ : breadth of polar lobe 19 μ . Intervale!

Var. *RALFSII* Wood. Saco Lake (*Wood*).

E. GEMMATUM (Bréb.) Ralfs. Length 40 μ : breadth 31 μ : isthmus 8 μ : breadth of polar lobe 15 μ . Intervale. Meredith (Herbarium Johnson no. 369). Plymouth and Laconia (*West*).

E. HASTINGSII Wolle. Cocheco River (*Wolle*).

E. BINALE (Turp.) Ehrenb., var. *ELOBATUM* Lund. Length 25 μ : breadth 18.5–20 μ : isthmus 4.5–5 μ : breadth of polar lobe 10 μ . North Woodstock (H. C. no. 186)! Pudding Pond, North Conway!

* Var. *INSULARE* (Roy) Wittr. Length 28 μ : breadth 19 μ : isthmus 5 μ . Mt. Moosilauke (H. C. no. 80)!

E. ELEGANS (Bréb.) Kütz. White Mountains (*Wood*).

E. INERME Lund. Length 50–65 μ : breadth 34–42 μ : breadth of polar lobe 10–12 μ . Intervale! Noone's Station!

E. DENTICULATUM (Kirch.) Gay. Length 37 μ : breadth 27 μ : isthmus 6.4 μ : breadth of polar lobe 20 μ . Pudding Pond, North Conway (H. C. no. 123)!

* *E. PYRAMIDATUM* West. Length 23 μ : breadth 19 μ : isthmus 5 μ : breadth of polar lobe 14 μ . Pudding Pond, North Conway! (H. C. no. 123). The American specimens do not differ materially from the British ones.

E. EVOLUTUM (Nordst.) W. & G. S. West. var. *INTEGRIS* W. & G. S. West (*E. spinosum* Wolle). Length 53–59 μ : breadth 35–36 μ : isthmus 8.5–9.5 μ : breadth of polar lobe 28–31 μ . Pudding Pond, North Conway! Intervale!

* *E. PAPILIO* Racib.? Length 56 μ : breadth 37 μ : isthmus 10 μ :

breadth of polar lobe 26μ . North Woodstock (H. C. no. 190)! A single semi-cell was all that was seen of this species and it is therefore referred here with somewhat of a question. The finding of more material may show it to be a new species.

* *E. CIASTONII* Racib. Length 44μ : breadth 26μ : isthmus 5.5μ : breadth of polar lobe 20μ . Noone's Station (H. C. no. 394)! This species has been reported from Florida by the Wests.

E. FISSUM W. & G. S. West. var. ***Americanum** var. nov. (Plate 64, fig. 2). Length 44μ : breadth 25μ : isthmus $4.5-6 \mu$. Variety differing considerably in ornamentation from the typical having a rounded granule at each side of the polar incision, a ring of eight granules about the base of protuberance of each semi-cell and with double instead of single granulations at the base. Pudding Pond, North Conway (H. C. no. 129)! The species is new to U. S. having been described from Ceylon.

MICRASTERIAS Ag.

M. TORREYI Bail. Length 215μ : breadth 310μ : breadth of polar lobe 90μ : isthmus 35μ . Pudding Pond, North Conway, rare! Surface slightly roughened with minute granules.

M. RADIOSA Ag. Length 158μ : breadth 148μ : isthmus 21μ : breadth of polar lobe 36μ . Pudding Pond, North Conway!

Var. *SWAINEI* (Hastings) W. & G. S. West. Rochester (*Wolle*).

M. ROTATA (Grev.) Ralfs. Length 242μ : breadth 226μ : isthmus 27μ : breadth of polar lobe 57μ . Pudding Pond, North Conway!

M. DENTICULATA Bréb. Length $280-310 \mu$: breadth $240-300 \mu$: isthmus $30-42 \mu$: breadth of polar lobe $65-76 \mu$. Intervale! North Woodstock! Pudding Pond, North Conway! Hanover (*Edwards*).

M. FIMBRIATA Ralfs. Rochester (*Wolle*).

M. FURCATA Ag. Length $150-186 \mu$: breadth $124-150 \mu$: isthmus $22-23 \mu$: breadth of polar lobe $62-94 \mu$. Noone's Station, frequent!

* Var. *SIMPLEX* *Wolle*. Length 190μ : breadth 186μ : isthmus 18μ . Pudding Pond, North Conway! Although it has been conclusively shown that this variety grades into the typical form, it is noteworthy that in this particular instance, the two forms were distinct in the localities given, and no traces of the other form seen in either case.

M. RINGENS Bail., var. SERRATULA Wolle. Laconia (*Wests*, H. J. nos. 650, 679)!

M. AMERICANA (Ehrenb.) Ralfs. Length 140 μ : breadth 125 μ : isthmus 28 μ : breadth of polar lobe 77 μ . North Woodstock!

Var. RECTA Wolle. Length 143 μ : breadth 121 μ : isthmus 28 μ : breadth of polar lobe 65 μ . North Woodstock (H. C. no. 179). Although this is of about the same size as the typical form the whole character of the end lobe is quite different.

M. MAHABULESHWARENSIS Hobson. Meredith, rare (*Johnson*).

M. NORDSTEDTIANA Wolle. Breadth 170 μ . Meredith, rare (*Johnson*).

M. CRENATA Bréb. Hanover (*Edwards*).

M. TRUNCATA (Corda) Bréb. Length 77-118 μ : breadth 82-105 μ : isthmus 21-24 μ : breadth of polar lobe 60-78 μ . Intervale! Pudding Pond, North Conway!

M. LATICEPS Nordst., forma MAJOR Nordst. Length 150 μ : breadth 198 μ : isthmus 31 μ . Pudding Pond, North Conway, rare!

M. PINNATIFIDA (Kütz.) Ralfs. Length 56-65 μ : breadth 68-72 μ : isthmus 9.5 μ : breadth of polar lobe 50 μ . Intervale! Pudding Pond, North Conway!

M. DEPAUPERATA Nordst., var. WOLLEI Cushman. Length 140 μ : breadth 130 μ : isthmus 25 μ : breadth of polar lobe 90 μ . Pudding Pond, North Conway, rare!

M. FOLIACEA Bail. Length 80-96 μ : breadth 80-85 μ : isthmus 14.5-15 μ : breadth of polar lobe 36-38 μ . Pudding Pond, North Conway, rare! Laconia, rather scarce in a pond on a stream flowing from Lake Winnepesaukee (*Wests*, H. J. no. 665)!

M. MURICATA Bail. Length 160-180 μ : breadth 120-140 μ : isthmus 21-22 μ : breadth of polar lobe 120-140 μ . Pudding Pond, North Conway, rare!

* Forma **minor** forma nov. Length 123 μ : breadth 84 μ : isthmus 16 μ : breadth of polar lobe 84 μ . Intervale!

COSMARIUM (Corda) Lund.

C. CONNATUM Bréb. (*Calocylindeus connatus* Wolle, '92). Length 53-56 μ : breadth 40-45 μ : isthmus 37-42 μ . Pudding Pond, North Conway! Intervale!

C. PSEUDOCONNATUM Nordst. (*Calocylindeus pseudoconnatus*

Wolle, '92). Length 32 μ : breadth 22 μ : isthmus 20 μ . Intervale, frequent!

* *C. THWAITESII* Ralfs. (*Calocylindrus Thwaitesii* Wolle, '92). Length 133 μ : breadth 50 μ : isthmus 40 μ . North Woodstock (H. C. no. 183)!

C. MONILIFORME (Turp.) Ralfs., forma *ELONGATA* W. & G. S. West. Length 41 μ : breadth 11 μ : isthmus 7 μ . Laconia (H. J. no. 658).

C. VIRIDE (Corda) Josh. Length 48-49 μ : breadth 25-26 μ : isthmus 20 μ . Holderness (*Wests*).

C. GLOBOSUM Bulnh., var.* *SUBARCTOUM* Lagerh. Length 13.5 μ : breadth 11 μ : isthmus 8 μ . Pudding Pond, North Conway (H. C. no. 129)! Variety new to the U. S.

C. CONTRACTUM Kirch. Length 56 μ : breadth 40 μ : isthmus 12.5 μ . North Woodstock!

* *C. OBLIQUUM* Nordst., var. *TRIGONUM* West. (Plate 64, fig. 4). Length 25 μ : breadth 19 μ : isthmus 10 μ . Mt. Moosilauke (H. C. no. 78)! Variety new to U. S.

C. BAILEYI Wolle. Length 40 μ : breadth 45 μ : isthmus 15 μ . Squam Lake!

C. REGNESII Reinsch. Length 12 μ : breadth 12 μ : isthmus 5 μ : thickness 5 μ . Laconia (*Wests*).

C. EXIGUUM Arch., forma* *MAJOR* Nordst. Length 37 μ : breadth 25 μ : isthmus 5 μ . Pudding Pond, North Conway! The typical form was reported by Wolle from Florida, the variety is new to U. S.

C. NITIDULUM DeNot. Length 28 μ : breadth 25 μ : isthmus 6 μ . Pudding Pond, North Conway!

C. PYRAMIDATUM Bréb. Length 78-100 μ : breadth 52-59 μ : isthmus 9-18 μ . North Woodstock! Noone's Station!

C. PSEUDOPYRAMIDATUM Lund. Length 56 μ : breadth 40 μ : isthmus 11 μ . Intervale!

* *C. claviferum* sp. nov. (Plate 64, fig. 3). *C.* of medium size nearly twice as long as wide, surface punctate, the side of each semi-cell with ten scattered granules arranged as in the figure; at the end are four granules arranged in a diamond form, below near the base are four more granules in a curve the two outer ones being larger than the inner two, at each side of the semi-cell are two other granules: ends of the semi-cells thickened, median region at the isthmus depressed. Length 44 μ : breadth 26 μ : isthmus 8.5 μ . Pudding Pond, North Conway!

C. PACHYDERMUM Lund., forma * *MINOR* Nordst. Length 73 μ : breadth 45 μ : isthmus 18.5 μ . Pudding Pond, North Conway!

C. PERFORATUM Lund. Length 61 μ : breadth 57 μ : isthmus 34 μ . Plymouth and Laconia (*Wests*).

C. CAPENSE DeToni. Length 76 μ : breadth 68–75 μ : isthmus 36 μ : Pudding Pond, North Conway!

C. TAXICHONDRUM Lund., forma *BIDENTULUM* Lagerh. Length, 40–42 μ : breadth 40–46 μ : isthmus 12–13 μ . Pudding Pond, North Conway! Intervale! Noone's Station!

C. SUBNUDICEPS W. & G. S. West. Length 44 μ : breadth 34 μ : isthmus 8 : thickness 16 μ . Laconia (*Wests*).

C. COSMETUM W. & G. S. West. Length 53 μ : breadth 43 μ : isthmus 13 μ : thickness 28 μ . Laconia (*Wests*, H. J. no. 672)!

C. QUINARIUM Lund. Length 38–40 μ : breadth 34–37 μ : isthmus 8–10 μ . Pudding Pond, North Conway! Intervale! Mt. Moosilauke!

C. TRIPLICATUM Wolle. Length 53 μ : breadth 39 μ : isthmus 12.4 μ . Holderness (H. J. no. 375)! and Plymouth (*Wests*).

C. POLYMORPHUM Nordst. Length 40 μ : breadth 31 μ : isthmus 7 μ . Intervale!

C. RACIBORSKII Lagerh. Length 44–48 μ : breadth 50–53 μ : isthmus 20–21 μ . Meredith, very rare (*Johnson*): Laconia, occasional (*Wests*).

C. BOECKII Wille. Length 28 μ : breadth 30: isthmus 7 μ . Squam Lake!

C. TETROPTHALMUM (Kütz) Menegh. Length 57–81 μ : breadth 53–60 μ : isthmus 14–22 μ . Intervale! Pudding Pond, North Conway, common!

C. MARGARITATUM (Lund.) Roy & Biss. Length 90 μ : breadth 72 μ . Meredith, rare (*Johnson*).

C. PSEUDOORBICULARE Cushman. Length 29–32 μ : breadth 21–24 μ : isthmus 8 μ . Intervale! Squam Lake!

C. INTERMEDIUM Delp. Length 62 μ : breadth 53 μ : isthmus 21 μ : thickness 33 μ . North Woodstock!

* *C. FAVUM* W. & G. S. West. Length 70 μ : breadth 60 μ : isthmus 21 μ . Pudding Pond, North Conway! Slightly larger than the measurements of the type. As this species was described simply as North American this is its first definitely recorded locality.

C. DENTATUM Wolle. Length 125 μ : breadth 102 μ : isthmus 25 μ . Squam Lake!

C. LATUM Bréb. Meredith (*Wests*).

C. RENIFORME Arch., var. *COMPRESSUM* Nordst. Length 55 μ : breadth 53 μ : isthmus 17 μ : thickness 27 μ . Laconia (*Wests*, H. J. no. 661)!

C. OCHTHODES Nordst. Length 69 μ : breadth 56 μ : isthmus 15 μ . Intervale!

* *C. QUADRUM* Lund., forma **Johnsoni** forma nov. (*C. quadrum* Lund, forma. Johnson, Bull. Torr. Bot. Club., v. 22, 1895 (July) p. 294, Pl. 240, f. 22). Length 44 μ : breadth 40 μ : isthmus 14 μ . Plymouth (H. J. no. 359).

* *C. GRANDIFORME* Schmidle, var. **Americana** var. nov. (Plate 64, fig. 5). Length 53 μ : breadth 35 μ : isthmus 18 μ . This variety is considerably smaller than the typical, in other points not varying greatly. Species new to U. S. Pudding Pond, North Conway!

C. SUBORBICULARE Wood. (*C. isthmochondrum* Nordst.) Length, 31 μ : breadth 28 μ : isthmus 5 μ . Pudding Pond. North Conway! Saco Lake (*Wood*). As it seems certain that both of the above names represent a single species the older name of Wood should be retained.

C. CYCLICUM Lund. Meredith (*Johnson*).

C. AMOENUM Bréb., var. *TUMIDUM* Wolle. Length 40-47 μ : breadth 22-25 μ : isthmus 12 μ . Pudding Pond, North Conway! North Woodstock!

* *C. HOMALODERMUM* Nordst. Length 43 μ : breadth 37 μ : isthmus 7 μ . Intervale!

C. PHASEOLUS Bréb., var. *ELEVATUM* Nordst. Length 41 μ : breadth 25 μ : isthmus 5 μ . Var. new to U. S. Pudding Pond, North Conway!

C. RECTANGULARE Grun. Length 38 μ : breadth 30 μ : isthmus 10 μ : thickness 18 μ . Laconia occasional (*Wests*).

C. PYGMAEUM Arch., var. *SCHLIEPHACKEANUM* (Bréb.) W. & G. S. West. (*C. Schliephackeanum* Wolle, '92). Laconia occasional (*Wests*).

C. SINOSTEGOS Schaarschm., var. *OBTUSIUS* Gutw. Length 10 μ : breadth 8 μ : isthmus 3 μ : thickness 4 μ . Laconia, occasional (*Wests*).

C. ORNATUM Ralfs. Length 26-32 μ : breadth 27-34 μ : isthmus 8-10 μ . Pudding Pond, North Conway! Intervale! Squam Lake! Noone's Station!

C. ELOISEANUM Wolle. Length 105 μ : breadth 72 μ : isthmus 34 μ . Laconia, scarce (*Wests*, H. J. no. 641)!

* Var. DEPRESSUM W. & G. S. West. Length 92 μ : breadth without teeth 67 μ : with teeth 75 μ : isthmus 22 μ . A trifle larger than the measurements given by the authors. Pudding Pond, North Conway, frequent!

C. CAELATUM Ralfs, var.* **abnormale** var. nov. (Plate 64, figs. 6 and 7). Length 38-41 μ : breadth 37-38 isthmus 13-14 μ . The ends of the semi-cells are broadly truncate with five protuberances or lobes along the border each of these with two papillæ: at the side of each semicell is a large broadly rounded lobe as is usually seen in the typical species. Occasionally in the material there were specimens which showed the connection with the typical, but these were few and the variety on the other hand was abundant. North Woodstock (H. C. no. 187)!

C. BLYTTII Wille. Length 12 μ : breadth 12 μ : isthmus 3 μ . Squam Lake!

C. IMPRESSULUM Elfv. Length 25 μ : breadth 19 μ : isthmus 3.5 μ . Pudding Pond, North Conway!

C. PSEUDOPECTINOIDES Wolle. White Mountains (*Wolle*).

C. DISPERSUM Johnson. Length 40 μ : breadth 40-44 μ : isthmus 11 μ : thickness 20 μ . Meredith (*Johnson*).

PLEUROTAENIOPSIS Lund.

P. CUCUMIS (Corda) Lund. (*Cosmarium cucumis* Wolle, '92). Length 59-72 μ : breadth 34-43 μ : isthmus 15-17 μ . Pudding Pond, North Conway, frequent! Saco Lake (*Wood*).

P. DEBARYI (Arch.) Lund. (*Calocylindrus DeBaryi* Wolle '92). Length 75 μ : breadth 37 μ : isthmus 25 μ . Pudding Pond, North Conway!

* P. ELEGANTISSIMUM Lund. (*Cosmarium elegantissimum* Wolle '92), var. **simplicius** (W. & G. S. West) n. comb. Length 47 μ : breadth 22 μ : isthmus 19 . Intervale (H. C. no. 159)! The type of the variety was from Florida.

P. OVALE (Ralfs) Lund. (*Cosmarium ovale* Wolle '92), var. * **Westii** var. nov. The form mentioned by the Wests ('96) p. 249 as a common American form. It has a slightly subtruncate and

retuse apex, with the retuse portion without granules. Length 154–170 μ : breadth 86–93 μ : isthmus 30–36 μ . Pudding Pond, North Conway, scarce!

XANTHIDIUM Ehrenb.

X. ARMATUM (Bréb.) Rab. North Woodstock!

Var. CERVICORNIS W. & G. S. West. Length with spines 166 μ : without spines 130 μ : breadth with spines 125 μ : without spines 90 μ : isthmus 31 μ . Pudding Pond, North Conway! Saco Lake (*Wood*). There was no central group of granules as is frequently found in this species.

X. CRISTATUM Bréb. Length with spines 75 μ : breadth with spines 50 μ : isthmus 14 μ . Pudding Pond, North Conway! Noone's Station!

Var. UNCINATUM Bréb. Length with spines 80 μ : without 59 μ : breadth with spines 56 μ : without 40 μ : isthmus 11 μ . Pudding Pond, North Conway!

* Forma ANGULATUM West. Length with spines 72 μ , without 54 μ : breadth with spines 60 μ : without 40 μ : isthmus 11 μ . No central protuberance present. Pudding Pond, North Conway!

X. ANTILOPAEUM (Bréb.) Kütz. Length with spines 105 μ , without 71 μ : breadth with spines 102 μ , without 59 μ : isthmus 16 μ . Pudding Pond, North Conway!

Var. POLYMAZUM Nordst. Length with spines 62–84 μ , without 46–68 μ : breadth with spines 58–63 μ , without 45–62 μ : isthmus 14–16 μ . Pudding Pond, North Conway, frequent! Intervale! North Woodstock!

There is a considerable amount of variation even in this variety. Specimens from North Conway and Intervale have the long outwardly curved spines, and there are almost invariably but six granules in the chain. A considerably different form was met with from North Woodstock. This is like the specimen figured by L. N. Johnson under the variety *Minneapolisense* with the exception of the central spine. His specimen had the central spine above the chain of granules. That form was called var. *Johnsoni* by W. & G. S. West in a later paper, although Johnson calls attention to the extreme variability of this form. The present form lacks the spine of *Minneapolisense* but has the median lateral spine as well marked as the two adjacent

ones. In this character the present specimen is exactly like that figured by Johnson. Nordstedt also figures this peculiarity in var. *polymazum* but it is in his specimens much less marked.

* Forma **curvispinum** forma nov. (Plate 64, fig. 11). Length with spines $93\ \mu$: without $56\ \mu$: breadth with spines $108\ \mu$, without $50\ \mu$: isthmus $13.5\ \mu$. Membrane punctate: the spines at the end start straight then curve outward making a decided angle. Pudding Pond, North Conway, common!

* Forma **callosum** forma nov. (Plate 64, fig. 12). Length with spines $84\ \mu$, without $58\ \mu$: breadth with spines $74\ \mu$, without $44\ \mu$: thickness $25\ \mu$: isthmus $13\ \mu$. There is a thickened spot at the center of each semicell. Pudding Pond, North Conway, frequent!

X. TYLERIANUM West. (*X. antilopaeum*, var. *truncatum* Wolle). Rochester, (*Wolle, Hastings*).

X. CONTROVERSUM W. & G. S. West. Length with spines $55-59\ \mu$, without $36.5-38\ \mu$: breadth with spines $52-56\ \mu$, without $31\ \mu$: isthmus $7.6-8\ \mu$: thickness $20-21\ \mu$. Laconia (*West*s).

* X. BENGALICUM Turner. (Plate 64, fig. 10). Length with spines $90\ \mu$, without $68\ \mu$: breadth with spines $108\ \mu$, without $62\ \mu$: isthmus $22\ \mu$: length of spines $20\ \mu$. Near the upper end of each semicell is a row of $15-20$ small granules. Squam Lake! New to U. S.

* X. TETRACENTROTUM Wolle. (Plate 64, figs. 8 & 9.) Length $37\ \mu$: breadth with spines $53-57\ \mu$, without $32-34\ \mu$: isthmus $9.5\ \mu$. Intervale! Pudding Pond, North Conway! There is a great variation in the number and arrangement of the granules in this species. In the specimen from Intervale, fig. 9, there are indications of two distal spines one on each semicell.

ARTHRODESMUS Ehrenb.

A. CONVERGENS Ehrenb. Length $33-40\ \mu$: breadth with spines $45-50\ \mu$, without $34-35\ \mu$: isthmus $8\ \mu$. Intervale!

A. QUADRIDENS Wood. Length $35\ \mu$: breadth with spines $50\ \mu$: without $35\ \mu$: isthmus $8\ \mu$. Pudding Pond, North Conway!

A. INCUS (Bréb.) Hass. var. * LONGISPINUS Eichl. & Racib. Length with spines $42\ \mu$, without $14\ \mu$: breadth with spines $38\ \mu$, without $14\ \mu$: isthmus $6.5\ \mu$: length of spine $20\ \mu$. Pudding Pond, North Conway!

* Var. VALIDUS W. & G. S. West. Length with spines $68-71\ \mu$,

without 34–36 μ : breadth with spines 75–77 μ , without 36–43 μ : isthmus 7–8 μ : length of spine 25–27 μ . Spines shorter than the typical form. Pudding Pond, North Conway!

*Var. *RALFSII* W. & G. S. West. Length 25 μ : breadth with spines 59 μ , without 19 μ : isthmus 6.2 μ . Pudding Pond, North Conway (H. C. no. 164)! Squam Lake!

A. OCTOCORNIS Ehrenb. Length with spines 46 μ , without 14 μ : breadth with spines 44 μ , without 22 μ : isthmus 6 μ . Pudding Pond, North Conway!

*Forma *MINOR* Jacobs. Length with spines 21 μ , without 14 μ : breadth with spines 18 μ : isthmus 3 μ . Intervale! Var. new to U. S.

A. TRIANGULARIS Lagerh., var. *INFLATUS* W. & G. S. West. Length 38–40 μ : breadth with spines 68–72 μ : without 21–25 μ : isthmus 6.5–7 μ . Pudding Pond, North Conway, frequent! Laconia (*Wests*, H. J. no. 659).

STAURASTRUM Meyen.

S. ANCHORA W. & G. S. West. Length 76 μ : breadth 140 μ . Laconia, (*Wests*, H. J. no. 657).

S. ARACHNE Ralfs. Length 42 μ : breadth with processes 52 μ : isthmus 16 μ . Noone's Station! Saco Lake (*Wood*).

S. ARCTISCON (Ehrenb.) Lund. (*S. munitum* Wood.) Length with processes 150–155 μ , without 72–96 μ : breadth with spines 142–160 μ , without 62–68 μ : isthmus 31–33 μ . Wolle's figures of this species are not at all good. The figures of Wood are much more nearly correct. In their paper "On Some North American Desmidiaceae" (Trans. Linn. Soc. Lond. Ser. II. (Bot.) vol. v. pt. 5, p. 269) the Wests give the following: "All American examples we have seen of this species have shorter processes than the European ones, and they have at most but three rings of small teeth on each process." While this has been found true in Massachusetts specimens and some of those from New Hampshire it does not always hold true. The specimens from Pudding Pond, North Conway have long processes which are bifurcate at the apices as figured by Wood and have six or more rings of teeth on each process. Pudding Pond, North Conway! Squam Lake! Meredith, Holderness (*Wests*).

**S. ARCUATUM* Nordst., forma *ACICULIFERA* W. & G. S. West. Length with processes 26–27 μ , without 19 μ : breadth with proc-

esses 32-48.5 μ , isthmus 7.5-9.5 μ . Intervale! This variety is described simply as North American by the authors so that this record is the first with a definite locality. The specimens are in every way like the type of the variety except for slight variations in measurements.

* *S. BOTROPHILUM* Wolle. Length 46-50 μ : breadth 34-40 μ : isthmus 9.5-11 μ . North Woodstock, common!

S. BRASILIENSE Nordst. Length with spines 133 μ , without 75 μ : breadth with spines 120 μ , without 63 μ : isthmus 33 μ . Pudding Pond, North Conway! One specimen was noted which was five armed in end view.

S. CERASTES Lund. Length 56 μ : breadth with processes 46 μ : isthmus 11 μ . Pudding Pond, North Conway (H. C. no. 122)! This agrees in every way with the original figures of Lundell.

* *S. CLAVIFERUM* W. & G. S. West. Length 36 μ : breadth with processes 42 μ , without 34 μ : isthmus 12 μ . Squam Lake! This again gives a definite locality for a species recorded simply as North American.

* *S. CONCINNUM* W. & G. S. West. (*S. forficulatum* Wolle '92.) Length 45 μ : breadth 72 μ : isthmus 12 μ . Intervale!

* *S. CORNIGERUM* Roy & Biss. Length 38 μ : breadth with spines 41 μ : isthmus 10 μ . Pudding Pond, North Conway (H. C. no. 151)! Intervale! New to U. S.

S. ECHINATUM Bréb. Length 42 μ : breadth 34 μ . Pudding Pond, North Conway!

S. FORFICULATUM Lund., var. *ENOPLON* West. (*S. crescentum* Hastings) Dover (*Wolle*).

S. GRACILE Ralfs. Breadth with processes 50-62 μ : isthmus 10.5 μ . Pudding Pond, North Conway!

S. GRANDE Bulnh. Length 70 μ : breadth 65 μ : isthmus 15 μ . Intervale! Meredith (*Johnson*).

S. JOHNSONII W. & G. S. West. Length 45-56 μ : breadth with processes 82-102 μ : breadth at base 14-18 μ : isthmus 8-9 μ . Intervale, common! Meredith, Holderness, Laconia (*Wests*).

S. LACONIENSE W. & G. S. West. Length 31 μ : breadth with spines 48-53 μ : without 38 μ : isthmus 12 μ . Pudding Pond, North Conway! Laconia (*Wests*).

S. LEPTACANTHUM Nordst. Length with processes 84 μ , without 34 μ : breadth with processes 65 μ , without 22 μ : isthmus 11 μ . Pud-

ding Pond, North Conway! This was the typical form, that called by Lagerheim 6 + 4 radiata.

S. LEPTOCLADUM Nordst. Length with processes 74–80 μ , without 30 μ : breadth with processes 96–112 μ : isthmus 11 μ . Pudding Pond, North Conway!

S. LEWISII Wood. Breadth with processes 62 μ : without 34 μ : isthmus 5.5–6 μ . Pudding Pond, North Conway (H. C. no. 136)! Saco Lake (*Wood*). This has the basal spines, the absence of which seems to be the only difference between it and *S. aristiferum* Ralfs. var. *parallelum* W. & G. S. West.

* S. LONGIRADIATUM W. & G. S. West, forma MAJOR W. & G. S. West. Length with processes 62–68 μ , without 31 μ : breadth with processes 80–90 μ , isthmus 10 μ . Pudding Pond, North Conway (H. C. no. 151)! This had more curved processes than the specimen figured by the authors but was in essential points the same. It had the three spines at the end of the processes which is characteristic of the form. This again gives a definite locality for a species described simply as North American.

* S. LONGISPINUM (Bail.) Arch., var. **bidentatum** (Wittr.) n. comb. (Plate 64, fig. 13.) (*S. bidentatum* Wittr.) Length 103 μ : breadth with spines 125–155 μ , without 90–92 μ : isthmus 33 μ : length of spine 29 μ . Squam Lake! Pudding Pond, North Conway, occasional! The form with two spines at each angle and these short and fairly stout instead of long as in the typical.

* S. LUNATUM Ralfs. Length with spines 40 μ , without 30 μ : breadth with spines 40–44 μ , without 28–32 μ : isthmus 6.5 μ . Pudding Pond, North Conway!

S. MACROCERUM Wolle. Length 58 μ : breadth with processes 125–127 μ : without 22–25 μ : isthmus 15 μ . Pudding Pond, North Conway, frequent!

S. MEGACANTHUM Lund. Length 46 μ : breadth with spines 83 μ . Pudding Pond, North Conway!

S. MEGALONOTUM Nordst. Length with spines 48 μ : breadth with spines 40 μ : isthmus 12.5 μ . Pudding Pond, North Conway (H. C. no. 131)!

Forma OBTUSUM Hast. Rochester (*Hastings*).

* S. MINUTISSIMUM Reinsch., var. CONSTRICTUM West. Length 24 μ : breadth 24 μ : isthmus 9 μ . Squam Lake!

S. MUTICUM Bréb. Length 36 μ : breadth 36 μ . Squam Lake!

S. OPHIURA Lund., var. **TETRACERUM* Wolle. Length 60 μ : breadth with processes 108 μ : without 24 μ : isthmus 15 μ . Pudding Pond, North Conway, frequent!

S. PARADOXUM Meyen. Breadth 45 μ . Squam Lake! Saco Lake (*Wood*).

S. PENTACLADUM Wolle. Length 38 μ : breadth with processes 47–52 μ : without 13–25 μ : isthmus 8–16 μ . Intervale! Noone's Station!

* *S. pulcherrimum* sp. nov. (Plate 64, fig. 14). Length with spines 100 μ , without 80 μ : breadth with spines 78 μ , without 46 μ : isthmus 15.5 μ . In front view semicells compressed spherical, in end view quadrangular with the sides tumid, each angle with two large spines confluent at the base, sides with four vertical rows of paired granules arranged in fours. Pudding Pond, North Conway (H. C. no. 131)!

S. SALTANS Josh., var. *FORCIPIGERUM* Lagerh. (Plate 64, fig. 15.) Length without spines 65 μ : breadth with processes 118 μ : breadth at base 12.5 μ : isthmus 7 μ . Pudding Pond, North Conway, frequent!

S. SPONGIOSUM Bréb. Length with processes 65 μ , without 53 μ : breadth with processes 53 μ : isthmus 15 μ . Pudding Pond, North Conway (H. C. no. 129)!

* Var. *DEPAUPERATUM* Racib. Length 41 μ : breadth 28 μ : isthmus 8 μ . Pudding Pond, North Conway (H. C. no. 129)!

S. STRIOLATUM Næg. Breadth 34 μ : isthmus 10 μ . North Woodstock!

Forma *BRASILIENSE* Turner. Length 25 μ : breadth 22 μ : isthmus 7 μ . Laconia (*Wests*, H. J. no. 676).

S. SUBLAEVISPINUM Wests. Length 25 μ : breadth 37 μ : isthmus 7 μ . Laconia (*Wests*, H. J. no. 651)!

SPHAEROZOSMA Corda.

S. EXCAVATUM Ralfs, forma *LAEVIS* Rab. Length 12–12.5 μ : breadth of filament 12 μ : isthmus 4.5 μ . Pudding Pond, North Conway, frequent!

Forma *GRANULATA* Rab. (*S. spinulosum* Wolle,? '92). Length 9–10 μ : breadth of filament 9 μ : isthmus 3.2 μ . Pudding Pond, North Conway! Intervale!

ONYCHONEMA Wallich.

* O. NORDSTEDTIANA Turner. Length 12.5 μ : breadth 12.5 μ : isthmus 3.5 μ : thickness 6.4 μ . Filament twisted, from one face to the next face 24 cells, complete double turn 48 cells. Intervale!

O. LAEVE Nordst., var. MICRACANTHUM Nordst. Length 14 μ : breadth with processes 21 μ , without 16 μ : isthmus 3.5 μ . Intervale!

SPONDYLIOSIUM Bréb.

S. PULCHRUM (Bail.) Arch., var. INFLATUM (Wolle) W. & G. S. West. (*Sphaerosozoma pulchrum*, var. *inflatum* Wolle '92). Length 33 μ : breadth of filament 65 μ : isthmus 10 μ . Pudding Pond, North Conway (H. C. no. 138)! Laconia (Wests, H. J. no. 667)!

S. MONILIFORME Lund. (*Sphaerosozoma moniliforme* Wolle '92). Length 34 μ : breadth 17 μ . Laconia (Wests, H. J. no. 680)!

HYALOTHECA Ehrenb.

H. DISSILIENS (Smith) Bréb. Length 22 μ : breadth of filament 25-28 μ . Pudding Pond, North Conway! North Woodstock!

* Var. MINOR Delp. Length 12-15 μ : breadth of filament 18-22 μ . Intervale!

DESMIDIUM Ag.

D. APTOGONUM Bréb. Length 12 μ : breadth of filament 21-34 μ : isthmus 14 μ . Pudding Pond, North Conway, frequent! Intervale!

D. BAILEYI (Ralfs) Nordst. Length 20-25 μ : breadth of filament 21-25 μ . Pudding Pond, North Conway! Intervale!

D. SWARTZII Ag. Length 12 μ : breadth of filament 37-43 μ . Pudding Pond, North Conway! Intervale!

* D. COARCTATUM Nordst. Length 28-40 μ : breadth of filament, maximum 38-45 μ , minimum 25-33 μ . Pudding Pond, North Conway, common!

D. QUADRATUM Nordst. Length 22 μ : breadth of filament 36-40 μ . Intervale! Noone's Station!

D. GRACILICEPS (Nordst.) Lagerh. Pudding Pond, North Conway!

D. CYLINDRICUM Grev. Maximum breadth 46 μ , minimum 31 μ . Pudding Pond, North Conway!

GYMNOZYGA Ehrenb.

G. MONILIFORMIS Ehrenb. (*Bambusina Brebissonii* Wolle '92).
Length 25-37 μ : maximum breadth 18-25 μ , minimum 16-21 μ .
Pudding Pond, North Conway! Intervale!

Altogether in the two parts of the present paper there are reported two hundred and fifty-three species and varieties of Desmids. Hitherto there were but seventy-four reported from the State, so that one hundred and seventy-nine are new records for the State. A considerable number of the species or varieties were also new to the New England list. One thing is very noticeable and that is the confirmation of the fact that a granitic country or one with old geological rocks will give a much greater number of species than one of opposite character. In the collection from Pudding Pond, North Conway, in spite of the fact that but one collection was made at only one time of year there have been identified one hundred and twenty-six species and varieties, exactly one half of the whole number reported from all sources from the State. This number might be increased by a continued examination of the Pond at other seasons and at other parts. Altogether from the small amount of ground covered there is every indication that the State of New Hampshire will furnish a large part of the Desmids that will be reported from New England.

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EXPLANATION OF PLATE 64.

Figures 4, 10-13, $\times 400$: all others $\times 550$.

- Figure 1. *Euastrum crassum* (Bréb.) Kütz., var. *pulchrum* var. nov.
 " 2. *Euastrum fissum* W. & G. S. West, var. *Americanum* var. nov.
 " 3. *Cosmarium claviferum* sp. nov.
 " 4. *Cosmarium obliquum* Nordst., var. *trigonum* West.
 " 5. *Cosmarium grandiforme* Schmidle, var. *Americanum* var. nov.
 " 6, 7. *Cosmarium caelatum* Ralfs, var. *abnormale* var. nov. Fig. 7 shows connection with the typical form of the species.
 " 8, 9. *Xanthidium tetracentrotum* Wolle.
 " 10. *Xanthidium Bengalicum* Turner.
 " 11. *Xanthidium antilopaeum* (Bréb.) Kütz., forma *curvispinum* forma nov.
 " 12. *Xanthidium antilopaeum* (Bréb.) Kütz., forma *callosum* forma nov.
 " 13. *Staurastrum longispinum* (Bail.) Arch., var. *bidentatum* (Wittr.).
 " 14. *Staurastrum pulcherrimum* sp. nov.
 " 15. *Staurastrum saltans* Josh., var. *forcipigerum* Lagerh.